



MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : OECAIDS801C/OECAIML 801C Software Engineering

UPID : 008424

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following :

[1 x 10 = 10]

- (I) What is Software Engineering?
- (II) The software requirements specification (SRS) document should avoid discussing the _____.
- (III) What is the main goal of software testing in the software development lifecycle?
- (IV) Which one of the following is true for a critical path in a PERT chart?
 - (a) It is the path having maximum number of tasks
 - (b) It is the shortest path in terms of time
 - (c) It is the longest path in terms of time
 - (d) It is the path with the largest amount of slack time
- (V) Fill in the blank:
In a Collaboration diagram, objects are represented by _____.
- (VI) State True / False : Spiral life cycle model is not suitable for products that are vulnerable to large number of risks.
- (VII) The extent of data interchange between two modules is called _____.
- (VIII) What is the main use of a State chart diagram?
- (IX) In a software project, COCOMO is used to estimate _____.
- (X) What is the primary purpose of a Class diagram?
- (XI) Among development phases of software life cycle, _____ phase typically consumes the maximum effort.
- (XII) What is Code Inspection in software engineering?

Group-B (Short Answer Type Question)

Answer *any three* of the following :

[5 x 3 = 15]

2. Distinguish between alpha, beta, and acceptance testing. [5]
3. Discuss the concept of Project Monitoring in Software Engineering. Explain how effective project monitoring contributes to the successful completion of software development projects. [5]
4. What are the differences between Essential Use case and Real Use case? [5]
5. Explain the difference between the traditional Waterfall model and the Agile model. [5]
6. What are the shortcomings of Capability Maturity Model (CMM)? [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following :

[15 x 3 = 45]

7. (a) Identify the causes of and solutions for software crisis. [5]
 (b) Identify at least four basic characteristics that differentiate a simple program from a software product. [5]
 (c) Explain what problems would occur if no life cycle model is followed. [5]
8. (a) What are the main shortcomings of the DFD model? [4]
 (b) Draw the ER diagram of Library Management System and also explain it. [7]
 (c) What is Data Flow Diagrams? Write the essential observations about DFD. [4]
9. (a) What is Scrum and Agile methodology? [4]
 (b) What are the features of Scrum? [4]
 (c) How does Scrum framework work? [7]
10. (a) What is Coupling and Cohesion? [2]

- (b) How many types of Coupling? Describe about all types of Coupling. [6]
- (c) How many types of Cohesion? Describe about all types of Cohesion. [7]
11. (a) The nominal effort and duration of a project have been estimated to be 1000PM and 15 months. [4]
The project cost has been negotiated to be '200,000,000. The needs the product to be developed and delivered in 12 month time. What should be the new cost to be negotiated?
- (b) Why it is necessary to break down project activities into tasks? [5]
- (c) Write about the necessity of Software Configuration Management. [6]

*** END OF PAPER ***



MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : OECAIDS802B/OECAIML 802B Research Methodology

UPID : 008426

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following :

[1 x 10 = 10]

- (I) Expand IMRAD.
- (II) What is the main purpose of a conclusion in a report?
- (III) What is the key difference between research methods and methodology?
- (IV) What does ANOVA stand for?
- (V) What does TRIPS stand for?
- (VI) What is the first step in report writing?
- (VII) What is a working hypothesis?
- (VIII) Name any one non-probability sampling technique.
- (IX) What is the meaning of reproducibility in research?
- (X) What is meant by an oral presentation?
- (XI) Mention one source of research literature other than journals.
- (XII) What is the full form of SigmaStat?

Group-B (Short Answer Type Question)

Answer *any three* of the following :

[5 x 3 = 15]

2. What are the key steps involved in selecting and formulating a research problem? [5]
3. What are the key features of SPSS used in data analysis? [5]
4. Explain the importance of citation and proper acknowledgement in scholarly publishing. [5]
5. Explain the meaning and purpose of interpretation in research. [5]
6. What precautions should be taken while identifying research gaps? [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following :

[15 x 3 = 45]

7. (a) Discuss the common errors made during interpretation and report writing and how they can be avoided. [5]
(b) Describe the complete process of writing and presenting a research project from data interpretation to final conclusion. [10]
8. Compare and explain various types of research: Descriptive vs Analytical, Applied vs Fundamental, Quantitative vs Qualitative. [15]
9. (a) Compare and contrast different sampling methods with appropriate examples. [9]
(b) Explain method validation thoroughly, including its principles, process, and significance in research. [6]
10. (a) Discuss the ethical considerations in research involving human and animal subjects. Include the role and function of ethical committees. [5]
(b) Explain intellectual property rights in detail. Discuss the differences between patents, copyrights, and trademarks with examples. [10]
11. (a) Analyze the challenges in data collection and how they can be minimized. [8]
(b) Describe how observational methods are used in data collection and their relevance in qualitative research. [7]

*** END OF PAPER ***



MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PECAIDS801A/PECAIML 801A Natural language Processing

UPID : 008419

Time Allotted : 3 Hours

Full Marks : 70

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following :

[1 x 10 = 10]

- (I) What is the difference between rule-based and statistical POS tagging?
- (II) State the main assumption behind Naïve Bayes text classification?
- (III) Define Boolean retrieval in search engines.
- (IV) Explain the use tokenization in NLP?
- (V) What is the function of the Forward Algorithm in HMM?
- (VI) Define sentiment analysis.
- (VII) Explain how phrase queries improve search engine accuracy.
- (VIII) How does the Bayesian approach help in spell checking?
- (IX) Explain the term Part-of-speech (POS) tagging.
- (X) How does a probabilistic context-free grammar (PCFG) differ from a standard CFG?
- (XI) Explain how combining multiple ranking features enhances search engine performance.
- (XII) Why is spell-checking harder in morphologically rich languages?

Group-B (Short Answer Type Question)

Answer *any three* of the following :

[5 x 3 = 15]

2. Describe the various types of smoothing in n-grams. [5]
3. Explain the concept of context-free grammars and their significance in natural language processing. [5]
4. Define synonymy, homonymy, and polysemy in lexical semantics with suitable examples. [5]
5. Discuss the importance of multi-word extraction in NLP applications like machine translation and search engines. [5]
6. Given the phrase: "New York City is a great place for data science.", describe how an NLP system would identify "New York City" as a single entity. [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following :

[15 x 3 = 45]

7. (a) What is Named Entity Recognition (NER)? List different types of named entities and provide an example sentence with labelled entities. [7]
- (b) Explain the Bayesian approach to spell checking. How does it determine the most likely correct word for a misspelled word? [8]
8. (a) Briefly discuss the HMM model for part of speech tagging. [6]
- (b) Discuss the Viterbi algorithm for finding the optimal sequence of flags. [5]
- (c) Describe a real-world application where accurate POS tagging is essential. [4]
9. (a) Derive the bigram language model using maximum likelihood estimation, chain rule, and Markov assumption. [7]
- (b) How a language model can be evaluated intrinsically and extrinsically? Define and deduce perplexity. [5]
- (c) Discuss the notion of perplexity as a branching factor. [3]
10. (a) How does query term proximity improve search accuracy in Information Retrieval? [7]
- (b) Explain TF-IDF ranking with an example. [8]
11. (a) Consider the following Context-Free Grammar (CFG): [7]

1. $S \rightarrow NP VP$

2. NP $\rightarrow$ Det N | N
3. VP $\rightarrow$ V NP | V
4. Det $\rightarrow$ the | a
5. N $\rightarrow$ dog | man
6. V $\rightarrow$ chases | sleeps

Perform top-down parsing on the input sentence: "The dog chases a man."

- (b) Identify two challenges of top-down parsing and explain how they can be addressed. [5]
- (c) Identify two limitations of top-down parsing when applied to the given CFG for the sentence "The dog sees a man." [3]

*** END OF PAPER ***